GENERAL NOTES

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PARASITOID INDUCED MORTALITY IN THE EGGS OF THE ENDANGERED GIANT SWALLOWTAIL BUTTERFLY *PAPILIO HOMERUS* (PAPILIONIDAE)

Additional key words: Jamaica, Encyrtidae, Eulophidae, life history.

The giant swallowtail butterfly, *Papilio homerus* Fabricius, is confined to the Caribbean Island of Jamaica where it presently exists in two isolated and diminishing strongholds (Emmel & Garraway 1990). The numbers of *Papilio homerus* have been dwindling, and it now is listed in the IUCN Red Data Book as one of the four endangered swallowtail butterflies (Collins & Morris 1985).

Important contributions to our knowledge on the plight of *P. homerus* come from the works of Walker (1945), Emmel and Garraway (1990), and unpublished manuscripts by J. Parnell and T. Turner. None of these works, however, examine in detail, factors that might be controlling population numbers (Emmel and Garraway 1990). This paper presents the preliminary results of a survey investigating the importance of developmental mortality; here we examine the level of egg mortality due to parasitoids at a major population center.

This study was conducted at Fishbrook (near the village of Millbank) in the parish of Portland. The area is mainly secondary forest; large portions have been cleared over several decades for shifting cultivation. *Hernandia catalpaefolia* Britton and Harris, (Hernandiaceae) was the only larval food plant verified during this study. This plant is locally common in the damp ravines of the mountains of the parishes of Portland and St. Thomas and is endemic to this part of Jamaica. Adams (1972) recorded this plant between 450 m and 640 m elevation, but we recorded it as low 150 m.

One hundred and eight *Hernandia* trees were sampled. All leaves up to a height of 3 m above the ground were examined individually, and the following data were recorded: number of eggs observed, number of eggs hatched, and number of eggs attacked by various mortality factors. Sampling was done once a month from July to October 1991. The transfer of eggs from the field to the laboratory allowed for further examination and ensured that eggs were not counted more than once.

Females of *P. homerus* lay their eggs on the upper surfaces of the leaves. Most eggs or their remains persist for over one month, and it is quite easy to determine if a *P. homerus* egg has been attacked by parasitoids. Emergence holes of the parasitoids are small and round. Those of *P. homerus* larvae are larger and irregular in shape; occasionally the larva eat considerable portions of the chorion. Moreover, in parasitized eggs, larval exuviae and mummified larvae, pupae, or adults of the parasitoids were easily identified. Eggs without emergence holes were taken to the laboratory for study; examination under the microscope or hand lens revealed parasitoid ovipositional sites. All live material was allowed to develop.

Three species of hymenopterans, one member of the genus *Ooencyrtus* (Encyrtidae) and two of the genus *Chrysonotomyia* (Eulophidae), emerged from the eggs of *P. homerus*. *Ooencyrtus* sp. is undescribed and appears to be unlike any described species from the New World (Noyes pers. comm.). The genus *Ooencyrtus* is cosmopolitan; most species are polyphagous and are primarily parasitoids of the eggs of other insects, notably Heteroptera and Lepidoptera. The *Chrysonotomyia* spp. have not been identified to species; however, members of the genus *Chrysonotomyia* generally are parasitic on the eggs and larvae of phytophagous insects, mainly leaf-mining and gall forming Diptera and also Lepidoptera on herbaceous plants.

The parasitoids oviposited in the early stages of development of the *P. homerus* embryo while the contents of the egg were still fluid. Only once was the sclerotized remains of a

TABLE 1. Mortality of *P. homerus* eggs caused by parasitoids at Fishbrook, July to October 1992.

Month	No. of eggs	% eggs hatched	% eggs parasitized	% other mortality
July	258	9.3	79.5	11.2
August	108	17.6	71.3	11.1
September	63	19.0	76.2	4.8
October	14	7.1	64.3	28.6
Total	443			
Mean		12.6	76.5	10.8

P. homerus larva discernible in the remains of a parasitized egg. The larvae of the parasitoids generally consumed the contents of the egg and between 10 and 18 adult parasitoids generally emerged.

The parasitoids resulted in 76.5% (n = 443) egg mortality during the months July to October (Table 1). This is a significant portion of the 87.4% total egg mortality. The remaining 10.9% mortality was caused by fungus and a number of unidentified factors.

While the true role of the egg parasitoids is far from resolved, the 76.5% egg mortality they caused in this case is significant for an animal with extremely low densities. This suggests a very high efficiency in searching for *P. homerus* eggs or the possibility of alternate hosts that maintain the population of parasitoids at high levels. As pointed out by Parsons (1984), parasitoids breeding in a common alternate host may adversely affect the survival of a rare species.

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